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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,335	01/30/2004	Kazutoshi Shiba	Q79657	5230

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EXAMINER

RAO, SHRINIVAS H

ART UNIT PAPER NUMBER

2814

DATE MAILED: 08/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.



## Office Action Summary

Application No.

10/767,335

Applicant(s)

SHIBA ET AL.

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06/15/2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 June 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.



### ***Response to Amendment***

Applicants' amendment filed on June 06, 2005 has been entered and forwarded to the Examiner on June 15, 2005.

Therefore claims 1-8 as originally filed are currently pending in the Application.

Claims 9-10 were withdrawn by the Examiner as being drawn to a non-elected invention.

### ***Election/Restrictions***

Claims 9-10 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on June 06, 2005.

### ***Information Disclosure Statement***

The only IDS filed so far in this Application on January 30, 2004 has been considered on March 04, 2005 and the initialed copy of which is acknowledged as being received by the Applicants' in their response of June 06, 2005.

### ***Drawings***

Figures I A and B should be designated by a legend such as --prior Art-- because only that which is old is illustrated. See MPEP j 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.



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Applicants' attempt to file corrected drawings on June 06, 2005 is not acceptable because the corrected drawing figures are entitled " Related Drawings" ( a term not included in MPEP) whereas they should be entitled " Prior Art" ( See MPEP 608.02(g) , 37 CFR 1.121 and form paragraph 6.36.01 set out above). This requirement is Made Final.

Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application .

***Claim Rejections - 35 USC Section 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action.

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

Claims 1 to 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Cleemput et al. ( U.S. Patent No. 6,576,345, herein after Cleemput) in view of Applicants' admitted prior art, ( herein after AAPR ) .

With respect to claim 1 , Cleemput describes a semiconductor device, comprising: a semiconductor substrate', ( figure 2 3101, col. 6 line 16) a low dielectric



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constant film constituted essentially of a ladder-type hydrogen siloxane provided on semiconductor substrate, ( figure 2 3102, col. 6 line 14).

Cleemput does not specifically describe a protection film provided on said low dielectric constant film.

However , AAPR in figures IA-B and specification pages 2-3 describes a protection film provided on said low dielectric constant film to a barrier film ( 5) to provide an inert interface isolation and prevent damage in subsequent process like high temperatures and etching.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include AAPR'S barrier film in Cleemput's device to provide an inert interface isolation and prevent damage in subsequent process like high temperatures and etching.

The remaining limitations of claim 1 are : and a metal interconnect formed in said low dielectric constant film and said protection film. ( AAPR figure 1 A , B) ..

With respect to claim 2 Cleemput describes the semiconductor device as recited in Claim 1 , wherein said protection film is constituted of a material having greater polishing resistance against a chemical mechanical polishing process than said low dielectric constant film. ( Inherent property and AAPR specification page 2 e.g. Ta, etc. film have greater resistance than SiN).

With respect to claim 3 Cleemput describes the semiconductor device as recited in claim 1 wherein said protection film is constituted essentially of a silicon oxide film. ( AAPR specification page 2 line 10).



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With respect to claim 6 Cleemput describes the semiconductor device recited in claim 1 wherein a plurality of said metal interconnects is provided so as to form an isolated region where one of said plurality of metal interconnects is separately located and a concentrated region where the other metal interconnects are closely disposed to one another. ( AAPR Figure 1 A and B elements 12, 13 spec. page 3).

### ***Allowable Subject Matter***

Claims 4-5 and 7-8 include allowable subject matter which if rewritten in independent form ( including all limitations) may be allowable.

### ***Response to Arguments***

Applicant's arguments filed on 6/15/2005 have been fully considered but they are not persuasive for the following reasons :

Applicants' first contention that the Applied Cleemput reference does not disclose a ladder-type hydrogen siloxane formed on the semiconductor substrate is not commensurate with the presently recited claim 1 etc. which presently ONLY recites , the open ended " comprising" that does not exclude the presence of other namely i.e. caged type siloxane further the claim recites in relevant part "a low dielectric constant film constituted essentially of a ladder-type hydrogen siloxane provided on said semiconductor substrate;" ( emphasis supplied) which when given its broadest possible interpretation as required by current case law merely says that ladder-type hydrogen siloxane is present .



However , Applicants are using the above recitation to argue that it ( the recitation ) excludes the presence of any caged type hydrogen silxoane which is clearly stretching the interpretation.

If Applicants' want to distinguish their claims on the basis that their alleged invention contains ONLY Ladder type hydrogen silxoane , then their claims must be amended to recite consisting of i.e. closed end language and further recite in relevant part " a low dielectric constant film consisting ONLY of a ladder-type hydrogen siloxane provided on said semiconductor substrate;".

Assuming arguendo that Applicants' have included the above language this still does not over come the prior art because Applicants' allegation that the Cleemput reference does not disclose a ladder-type hydrogen siloxane formed on the semiconductor substrate is not persuasive because Cleemput in col. 2 lines 22 to 26 state :

" Silsequioxanes can have essentially two-dimensional ladder-type or well defined three-dimensional caged structures . Upon polymerization ( typically done with a high temperature bake) both structure types form ladder-type cross-linked polymers. "

Therefore Cleemput teaches Silsequioxanes ( i.e. hydrogen siloxanes as also stated by Applicants') are formed consisting of a caged type, a ladder type and a mixture of both ladder and caged type and all of these includes a mixture of both cage and ladder type are described as being used in the dielectric layer and depending upon the characteristics desired the starting ingredients are added in required



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proportions and process conditions e.g. temperature to produce the desired proportion of ladder and caged type hydrogen siloxane in the mixture.

Further practically no one obtains either cage type or ladder type siloxane exclusively, which is also why Applicants' seem to be hesitant to use appropriate claim language to exclude the formation of caged type hydrogen siloxanes in their claims.

Further, is it well known in the art to obtain a mixture of caged type and ladder type siloxanes (true for applicants and references) and use a caged type, a ladder type and a mixture of both ladder and caged type and in dielectric layers used in integrated circuit formation. (see e.g. U.S. Patents Nos. 6,231,989; 6,576,300, 6,558,755 and 6,696,352 and Non-Patent Literature: Duane Bujalski et al., "Compositional And structural Analysis of.. Resin, DEC. 2002, Macromolecules, 2003, 36 pages 180-917 and Masafumi Unno et al., "Synthesis and Characterization Of Cage and Bicyclic Silsequioxanes..Silanols", 1999, Applied organometallic chemistry 13, pages 303-310).

Applicants' contention that Cleemput allegedly teaches away from two-dimensional ladder type silsequioxanes because Cleemput recognizes such silsequioxanes are often brittle and high temperature curing raises the dielectric constant in the final product is not persuasive because this argument misses Cleemput's teaching of depending upon the characteristics desired the starting ingredients are added in required proportions and process conditions e.g. temperature to produce the desired proportion of ladder and caged type hydrogen siloxane in the mixture.



Applicants' next contention that their first protection film and one embodiment the first and second protection film are constituted essentially of silicon oxide film and further " are structurally different in physical location and purpose " from the barrier film ( 5) of Applicants' Admitted Prior Art as shown at least in figs. 1A and 1B is not persuasive because AGAIN Applicants' arguments are commensurate in scope with the presently recited claim 1 etc. which presently ONLY recites " a protection film provided on said low dielectric constant film" ( emphasis supplied) . Further none of claims presently under consideration recite any of the alleged differences constituted essentially of silicon oxide film and further " are structurally different in physical location and purpose.

Applicants' are reminded that current U.S. practice requires the limitations on which the Applicants' rely ( namely its protection film consisted essentially of silicon oxide film , structurally different in physical location and purpose) are not stated in the claims . It is the claims that define the claimed invention, and it is claims , not specification that are anticipated or unpatentable . ***Constant V advanced Micro – Devices Inc., & USPQ 2d 1064***

If Applicants' want to distinguish their claims on the basis that their alleged invention ONLY recites an protection film consisted essentially of silicon oxide film , structurally different in physical location and purpose, then the claims must recite " protection film made of silicon oxide ONLY and located ONLY at for the ONLY purpose of " or similar language.



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Therefore all of Applicants' arguments are not persuasive and claims 1-8 are all finally rejected.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (571) 272-1718. The examiner can normally be reached on 8.00 to 5.00.

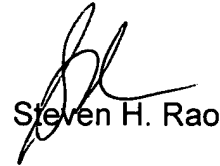
The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. ( up to 09/15/ 2005) or (571) 273-3800.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.



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Steven H. Rao

Patent Examiner

August 08, 2005.



LONG PHAM  
PRIMARY EXAMINER